Aquatic Life Support Use Assessment of Morehouse Brook

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Prepared by

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Biological assessment summary fact sheet – Morehouse Brook

Description of impaired water body

- Morehouse Brook is located in Chittenden County in the City of Winooski.

- Morehouse Brook has been listed as impaired from its confluence with the Winooski River to a point 1.5 miles upstream.

- Classified as a Class B water pursuant to the Vermont Water Quality Standards;

2. *Description of biological data used to characterize impairment:*
   - All biological data were collected from 1997-2004. Locations sampled – RM 0.3 (macroinvertebrates-3 events); RM 0.6 macroinvertebrates-1 event); Local reference stream Sunnyside Brook Tributary 1 (Macroinvertebrates -2 events)

   - Macroinvertebrate Community – DEC has conducted 4 Macroinvertebrate community sampling events from 2 sites from 1997-2004. Morehouse Brook is nearest to the Warm Water Moderate Gradient wadeable stream for purposes of macroinvertebrate assessments. However since it is an extremely small stream (Table 1) a local reference stream was used to modify the WWMG biometric expectations based on a local relatively undisturbed reference stream Sunnyside Brook Trib #1. Based on a modified macroinvertebrate assemblage expectation Morehouse Brook was rated as *poor* on all 4 occasions sampled.

3. *Stressor identification:*
   - Assessment of the characteristics of the biological communities and water quality, and physical habitat are inconclusive in regards to the identification of a single most significant stressor responsible for the impairment. It is highly probable that multiple factors related to watershed development, erosion and urban runoff resulting in alterations to the biological, chemical and physical characteristics of the stream are contributing to the impairment. Therefore, the primary stressor is identified as stormwater.

4. *Summary statement: overall "weight-of-evidence" summary of findings:*
   - Biological assessment data from Morehouse Brook provide the basis for impairment designation. Macroinvertebrate data from RM's 0.3 and 0.6 are used to presume whole watershed impairment. The data are of high quality and are representative of current conditions.

6. *Recommendations:* Macroinvertebrate assemblages at RM 0.3 should be sampled once every 5 years in conjunction with the 5-year sampling rotation used by the DEC. This site will be sampled in 2009 since this watershed falls into the rotation schedule for this year.

Figure 1: Location of biomonitoring sites on Morehouse Brook.

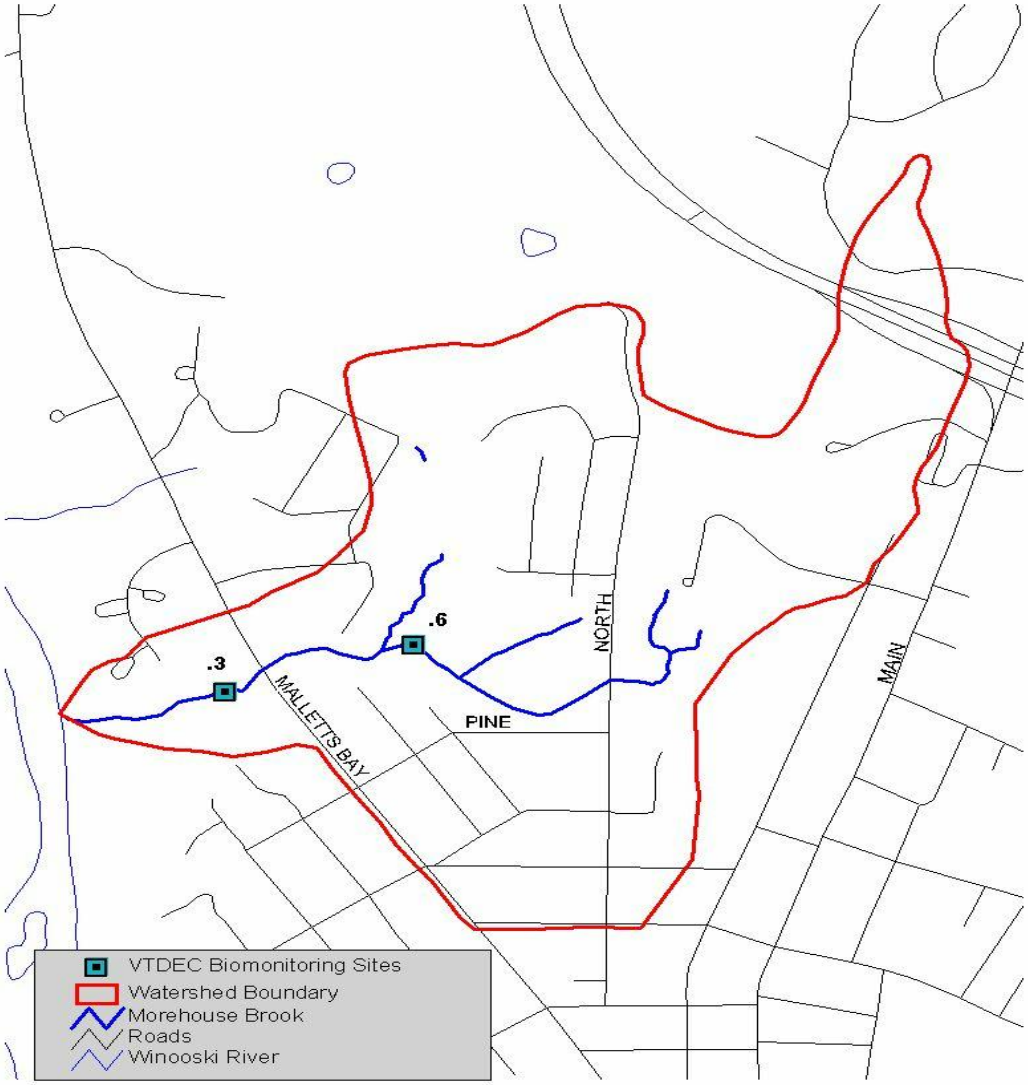

Table 1 Description of sampling sites and watershed attributes.

Location	Site (RM)	Description	DA (km^2)	Elevation ft	Latitude	Longitude
Morehouse Brook	0.3	Located imm. below Mallets Bay Avenue, below stormwater outfall.	1	160	44.499444	73.198056
	0.6	Located off residential street in Winooski below Myers Park Recreational area.	0.5	230	44.499167	73.193056
Sunnyside Brook Tributary #1	0.1	Located above confluence with Sunnyside Brook 100m. Local Attainment stream	0.75	180	44.519722	73.172778

Biological Assessment : Morehouse Brook has been sampled at two locations since 1997, and was found to be of poor biological integrity. The sampled reaches are at river mile 0.3 and 0.6. A description of the sampled reaches is presented in Table 1 and Figure 1. Morehouse Brook is a very small moderate gradient stream in the Champlain Valley. The macroinvertebrate community metrics were compared to the WWMG stream type for macroinvertebrates to make the Bioassessment. However since the stream drainage area is of very small size (about $1km^2$) compared to the reference WWMG streams best professional judgment based on a local relatively undisturbed stream will be used to modify the expectations of the WWMG stream type in determining when the biological integrity has recovered to a *good* condition. Additionally the VTDEC will continue to refine this expectation by continuing to evaluate a number of very small streams within relatively undisturbed drainages.

Table 2 presents the biometrics for the two sampling reaches from Morehouse Brook, as well as a site-specific modification to the WWMG stream type expectation for Class B ALS biocriteria. The modified expectation will be formalized based on a larger undisturbed regional stream database when it becomes available. The stream community was rated as *poor* primarily due to the extremely low density, richness and especially EPT (3-4 taxa) compared to the local reference stream. The poor diversity in EPT species has been consistent over the years and reaches sampled with the stream always dominated by two filter feeding caddis from he family Hydropsychidae. Several of these remaining species are, however, known as cold water obligates (*Diplectrona,* Leuctridae, and *Diamesa*). In the last sampling, the crayfish *Cambarus bartoni* (the Appalachian mountain crayfish) was also collected, indicating that this small stream is permanent and may be capable of supporting cold water fish species.

The percent model affinity (PMA-O) compares the composition of the dominant orders to the local reference expectation. The community composition is presented in Table 3**.** The PMA-O ranged from 37 to 57 percent. Compared to the local reference expectation the community is dominated by the tolerant order Diptera and moderately tolerant order Trichoptera. The highly water quality sensitive Ephemeroptera were absent for all sampling dates of Morehouse Brook. The Plecoptera were low in taxa richness, and composition. The PPCS-f compares the similarity of the functional feeding guilds between the local reference stream and Morehouse Brook. The Pinkham Pearson Coefficient of Similarity (PPCS-f) was below the minimum expectation: generally about 35 percent similarity. Table 4 presents the functional guild composition which shows that the generalist guilds collector gatherers and filterers tend to dominate the community. Detritus shredders should be present in high numbers in such a small stream as indicated by the local reference stream where the average about 40 percent. While present in Morehouse Brook they compose less then 20 percent of the feeding guild composition. The low percentage of algal shredders and scrapers indicates that in-stream primary productivity is not of major importance in the streams energy function.

In summary the community metrics and the order and functional composition of the community indicate that the environmental stressors are having a depressing effect on the overall biological integrity of the stream. This indicates that the stressors are likely to be those that alter habitat quality or are toxic to the biota. Habitat quality stressors often include altered hydrology (extreme high and low flows), sediment (both silt and sand), temperature, and others. Many of the above stressors are associated with storm-water quantity and quality. Storm-water is therefore likely the source of the stressors that have caused the poor biological condition of the stream community.

Recommended Monitoring : Macroinvertebrate assemblages at RM 0.3 should be sampled once every 5 years in conjunction with the 5-year sampling rotation used by the DEC. This site will be sampled in 2009 since this watershed falls into the rotation schedule for this year.

Table 2. Macroinvertebrate assessment and metrics from sites on Morehouse Brook, the mean for local "reference" stream Sunnyside Trib # 1, and a suggested modification to the WWMG stream type Class B biocriteria for Morehouse Brook.

Location		Date	Assessment	Density	Richness	Ept	PMA-O	BI (0-10)	Oligo%	Ept/ EptChiro	PPCS-F
Morehouse Brook	0.3	9/29/1997	Poor	133	19.5	3.5	48.0	3.01	6.7	0.70	0.38
		10/11/2002	Poor	292	23.0	3.0	57.0	2.31	3.8	0.82	0.34
		10/20/2004	Poor	420	19.5	4.5	37.4	4.83	2.2	0.35	0.32
	0.6	9/13/2000	Poor	969	24.5	3.0	44.5	3.73	3.1	0.42	0.36
Sunnyside Tributary #1 mean	0.1	2002-04		608	28	14.0	69.3	0.91	1.9	0.96	0.71
Site specific Modification				>300	**>20**	**>10**	>45.0	**<4.50**	<12.0	>0.45	>0.40
WWMG Median				2244	45.5	23.2	81.0	4.00	0.1	0.90	0.58
WWMG Class B				>300	>30	>16	>45.0	<5.40	<12	>0.45	>0.40

Table 3**.** Percent composition of Macroinvertebrate orders from sites on Morehouse Brook, and mean for local reference stream Sunnyside Tributary # 1.

Location	Station	Date	Coleoptera	Diptera	Ephemeroptera	Plecoptera	Trichoptera	Oligochaeta	Other
Morehouse Brook	0.3	9/29/1997	0.0	40.3	0.0	1.9	45.5	6.7	5.7
		10/11/2002	0.7	21.2	0.0	10.6	61.6	3.8	2.1
		10/20/2004	0.1	69.3	0.0	15.3	12.8	2.2	0.2
	0.6	9/13/2000	0.2	61.3	0.0	0.9	33.6	3.1	0.9
Sunnyside Brook Tributary#1 mean			0.3	6.6	6.1	42.2	27.1	1.6	0.7

Table 4. Percent composition of Macroinvertebrate functional feeding guilds from sites on Morehouse Brook, and mean for local reference stream Sunnyside Trib # 1.

Location	Station	Date	CollectorGatherer	CollectorFilterer	Predator	ShredderDet	ShredderHerb%	Scraper
Morehouse Brook	0.3	9/29/1997	23.7	49.6	5.7	18.7	0.4	1.5
		10/11/2002	17.1	62.0	5.5	14.0	0.0	0.0
		10/20/2004	53.5	25.4	3.1	18.0	0.0	0.0
	0.6	9/13/2000	45.9	33.2	2.4	12.2	0.7	0.8
Sunnyside Brook Tributary #1 mean			5.7	32.6	11.1	42.8	0.0	3.4